**Introduction**

The purpose of this document is to define the scope and requirements for a web application that aims to provide a real-time early warning system for natural disasters such as hurricanes, earthquakes, and floods specifically tailored for the Caribbean region. The system will leverage sensor networks and data analysis, along with the integration of the Open Weather API, to detect and predict these events, facilitating timely evacuation and emergency response.

**System Objectives:**

* Develop a user-friendly web application specifically focused on the Caribbean region, providing real-time information about potential natural disasters.
* Utilize sensor networks and data analysis techniques to detect and predict natural disasters accurately, with a specific emphasis on hurricanes, earthquakes, and floods in the Caribbean.
* Integrate the Open Weather API to access up-to-date weather information and enhance the accuracy of predictions and alerts.
* Enable users in the Caribbean to receive timely alerts and notifications regarding imminent threats.
* Facilitate efficient evacuation and emergency response in the Caribbean region by providing actionable information to authorities and affected individuals.
* Enhance situational awareness and decision-making capabilities during natural disasters specifically within the Caribbean context.

**Features and Functionalities**

The web application should include the following features and functionalities, while focusing on the Caribbean region:

Sensor Integration:

* Integrate with existing sensor networks, weather stations, seismic sensors, and flood gauges to gather real-time data.
* Support various data formats and protocols for seamless integration with different sensor types and models.

Data Analysis and Prediction:

* Implement advanced data analysis algorithms and models to process the collected sensor data.
* Utilize machine learning and statistical techniques to detect patterns and trends indicative of potential natural disasters.
* Develop predictive models that can forecast the likelihood, intensity, and trajectory of events such as hurricanes, earthquakes, and floods.

Real-time Monitoring and Alerting:

* Provide a live monitoring dashboard displaying real-time data, including weather conditions, seismic activity, water levels, etc.
* Generate automated alerts and notifications when critical thresholds are exceeded or when potential disasters are detected.
* Deliver alerts through multiple channels (e.g., SMS, email, push notifications) to ensure timely dissemination of information.

Evacuation and Emergency Response Support:

* Integrate with mapping and geolocation services to identify affected areas and provide evacuation routes and safe zones.
* Enable users to access emergency contact information, emergency shelter locations, and other relevant resources.
* Facilitate communication and coordination among emergency responders, government agencies, and affected individuals.

User Interface and Accessibility:

* Design an intuitive and user-friendly web interface that is accessible across devices (desktop, mobile, tablets).
* Ensure the application is responsive, scalable, and capable of handling high user loads during emergency situations.
* Implement multi-language support to cater to diverse user populations.

Integration with Open Weather API:

* Integrate the Open Weather API to access real-time weather data specifically for the Caribbean region.
* Fetch data such as storm tracks, wind speeds, precipitation forecasts, and other relevant weather information from the API.
* Combine the Open Weather API data with sensor data and analysis to improve the accuracy of predictions and provide comprehensive early warnings.

**Non-Functional Requirements**

* Security: Implement robust security measures to protect user data and prevent unauthorized access.
* Reliability: Ensure the system is highly available, resilient, and capable of handling failures gracefully.
* Scalability: Design the application to handle increasing data volumes and user traffic during disaster events.
* Performance: Optimize the system for fast data processing, real-time updates, and low latency.
* Compliance: Adhere to relevant data protection, privacy regulations, and industry standards.

**Constraints and Assumptions**

* The system will rely on the availability and reliability of existing sensor networks and data sources.
* The accuracy and timeliness of the predictions are subject to the quality and coverage of the sensor data.
* The web application will require an internet connection for real-time updates and communication.
* The system will be developed using modern web technologies and frameworks, ensuring compatibility across browsers and platforms.

**Conclusion**

This modified scope and requirements document outlines the key objectives, features, and functionalities of a web application specifically designed for the Caribbean region, aimed at providing a real-time early warning system for natural disasters. By leveraging sensor networks, data analysis, and the integration of the Open Weather API, the system aims to enhance preparedness, evacuation, and emergency response efforts specifically in the Caribbean context.